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FIELD OF THE INVENTION

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H. 323

5 An important key to the development of ToL and VoIP systems is the development of successful Quality of Service (QoS) IP networks. Generally, QoS refers to the ability of a network to guarantee specific performance levels, related to network bandwidth, availability, jitter, security, and data loss. High voice and/or video quality communication requires high QoS levels on

10 all network segments involved in the communication. Guaranteed QoS has been of particular concern on Ethernet LANs, both due to the bursty nature of IP traffic and the CSMA/CD contention protocol used by Ethernet.

In practice, implementation of the QoS Ethernet layer 115 requires modified application programs 103b in order to provide the required QoS Ethernet information at call setup. That is, each application program(s) 103b must be modified to provide one or more commands in addition to standard H.323 commands in order to invoke the required QoS. Thus, to support QoS Ethernet, a user must not only implement a QoS Ethernet layer but also change applications programs, such as telephone, fax, and the like. Further, each application program requires setup and configuration, which can cause added costs and delays in implementation.

SUMMARY OF THE INVENTION

These and other drawbacks in the prior art are overcome in large part by a system and method according to the present invention. According to one implementation of the present invention, a Generate QoS Ethernet layer is provided, interposed between an IP protocol voice communication layer and the QoS Ethernet layer. The Generate QoS Ethernet layer intercepts call commands, such as call setup commands, and identifies a required QoS for the particular call. The Generate QoS Ethernet layer then generates the QoS request commands required by the QoS Ethernet layer.

In one implementation, the Generate QoS Ethernet layer is embodied in an H.323 Recommendation telecommunication system. The Generate QoS Ethernet layer intercepts the H.225 call setup command, and accesses a database for a corresponding required QoS. The Generate QoS Ethernet layer then provides the QoS request to the QoS Ethernet layer. Various portions of the call setup command may be utilized for this purpose. For example, the bearer capability, the called party identification, or the conference reason portions of the call setup command may be associated in the database with particular QoS.

In another implementation, the H.245 terminal capabilities exchange is used to determine the required QoS. During the H.245 terminal capabilities exchange, the Generate QoS Ethernet layer analyzes the chosen codec(s), and accesses the database for the corresponding required QoS, which is then provided to the QoS Ethernet layer.

In still another implementation, the RAS information is used to determine the required QoS. For example, the gatekeeper admission request (ARQ) or bandwidth request (BRQ) signaling may be used to determine the QoS.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the invention is obtained when the following detailed description is considered in conjunction with the following drawings in

QoS req to the
QoS Ethernet
layer
DBase

conference reason
called party ID
bearer capability

call setup

via or
terminal
type

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call setup

FIG. 12 is a flowchart illustrating operation of an embodiment of the
25 invention.

FIGs. 2-12 illustrate an improved system and method for providing QoS in an Ethernet-type local area network. Call commands are intercepted and used to determine a required QoS. QoS Ethernet commands are then provided to a QoS Ethernet layer.

5 Recommendation-compatible system. It is noted that, while described herein
with regard to an H.323 network, the invention is equally applicable to *peer*
networks such as MGCP (Media Gateway Control Protocol), SIP+ (Inter MGS
Protocol), SGCP, MEGACO, and generally, any voice or multimedia over IP
scheme. Further, it is noted that an exemplary generic H.323 system is the
10 HiNet™ RC3000 system, available from Siemens.

20 More particularly, FIG. 3 illustrates a protocol stack according to an implementation of the invention. At the top are one or more application programs 103a. The application programs 103a, such as those of FIG. 1A, may be embodied as one or more telephony programs, such as fax, voice, video, and the like. Next is an Internet Protocol voice communication stack, 25 such as an H.323 protocol stack 101a, similar to that of FIG. 1A. Thus, the H.323 stack includes video codecs 102; audio codecs 104; a control layer 106 supporting H.245 control signaling for negotiation of media channel usage, Q.931 (H.225.0) for call signaling and call setup, and H.225.0 Registration, Admission and Status (RAS); a data layer 108 supporting T.120 for data 30 conferencing; and an RTP/RTCP layer 110. The Internet Protocol voice communication stack 101a lies atop a UDP/TCP layer 112 and an IP layer 114. Also included are a QoS Ethernet layer 115 and an Ethernet layer 116.

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new Further, a Generate QoS Ethernet layer 118 according to the present invention is provided. The Generate QoS Ethernet layer 118 may be provided between the IP layer 114 and the QoS Ethernet layer 115, as shown, or may be provided between the H.323 layer 101a and the IP layer 114.

5 As will be described in greater detail below, the Generate QoS Ethernet layer 118 intercepts call commands from the H.323 stack 101a, derives a required QoS therefrom, and generates the appropriate QoS commands for the QoS Ethernet layer 115.

Turning now to FIG. 4, an exemplary Generate QoS Ethernet module
 10 304 is illustrated in greater detail. The Generate QoS Ethernet module 304 includes a control unit 402 coupled to a memory 404. The memory 404 includes one or more lookup tables or databases 406 for storing conversions *Purpose of the ? table*
 15 between call commands and QoS Ethernet commands, as will be explained in greater detail below. The actual mappings may be configured by a system administrator or by the manufacturer. Also included is a buffer unit 408, including an input buffer 410 and an output buffer 412. The input buffer 410 receives the call commands and buffers them during access of the lookup table 406. The call commands are then transferred to the output buffer 412
 20 and the appropriate QoS commands inserted into the data stream. The commands are then output from the output buffer to the QoS Ethernet.

As noted above, according to one implementation of the invention, the H.225 call setup message is used to derive the QoS required by the QoS Ethernet layer 115. FIG. 5 illustrates schematically this process. Shown are an H.225 call setup command 500 and an exemplary QoS table 518. The
 25 QoS table 518 includes a plurality of QoS levels A, B, C, and D. The QoS levels A-D provide varying qualities of service. It is noted that, while four QoS levels are shown, in practice, differing numbers may be provided.

The H.225 call setup command 500 includes a protocol discriminator field 502; a conference reference value field 504; a message type field 506; a
 30 bearer capability field 508; a called party number field 510; a calling party number field 512; and an H.323 protocol data unit 516, which includes conference goal information 514. As will be explained in greater detail below,

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Exemplary mappings are shown in FIGs. 6A-6C. FIG. 6A illustrates the bearer capability field mapping 602. In particular, Voice is mapped to QoS level A; Voice and Video are mapped to QoS level B; and Data is mapped to QoS level C. It is noted that other QoS levels and/or mappings may be provided; thus, the figure is exemplary only. Similarly, FIG. 6B illustrates an exemplary mapping from a called party number 604. As shown, the called party number 1 maps to QoS level A; called party number 2 maps to QoS level B; and called party number 3 maps to QoS level C. Again, various other mappings may occur, as shown, for example, by the dashed line. Finally, the conference goal information 514 may be mapped as shown in FIG. 6C. In particular, as illustrated, whether the conference goal information indicates "set up new conference", "invite other into conference", or "join existing conference", the mapping is to QoS level A. Again, other mappings may be used.

According to yet another implementation of the invention, RAS messaging and, in particular, the gatekeeper Admission Request (ARQ) or Bandwidth Request (BRQ) messages may be used to derive a desired QoS level. For example, FIG. 8 illustrates use of the RAS messaging for QoS derivation. Illustrated are an Admission request (ARQ) message 800, the corresponding QoS table 518, and an Admission Confirm message 820. As is

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intended to be limited to the specific form set forth herein, but is intended to cover such alternatives, modifications and equivalents as can reasonably be included within the spirit and scope of the appended claims.

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